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Ocena wartości wskaźnika potencjału zapalnego diet DII (ang. dietary inflammatory index) oraz jego związku z wybranymi parametrami antropometrycznymi oraz biochemicznymi czynnikami ryzyka wystąpienia chorób sercowo-naczyniowych w grupie mieszkańców województwa dolnośląskiego

Assessment of the dietary inflammatory index (DII) and its relationship with selected anthropometric parameters and biochemical risk factors for cardiovascular diseases in a group of inhabitants of the Lower Silesia

Streszczenie w języku angielskim (Abstract)

Introduction: Chronic inflammation is implicated in the pathogenesis of many non-communicable diseases, including cardiovascular disease (CVD). Diet is an important element in the process of systemic inflammation and it is no coincidence that it is one of the most important factors in the development of lifestyle-related cardiovascular diseases. Inadequate diet has been associated with all metabolic disorders included in the metabolic syndrome (MetS), and all its components are modifiable risk factors for the development of CVD. Making appropriate lifestyle changes can reduce the risk of their occurrence. The DII authors evaluated the association of dietary components with 6 inflammatory biomarkers i.e., interleukin-1 β (IL-1 β), IL-4, IL-6, IL-10, tumor necrosis factor alpha (TNF- α) and C-Reactive Protein (CRP). The inflammatory potential for each food parameter was scored according to whether it increased (+1), decreased (-1), or had no effect (0) on 6 inflammatory biomarkers. It has been linked to indicators of systemic inflammation and CVD.

Purpose: The aim of the study was to assess the inflammatory potential of participants' diets enrolled in the Polish arm of the Prospective Urban and Rural Epidemiological (PURE)

study, and then to evaluate the association between the DII score with the dietary content, the nutritional value of diets and to determine the correlation of DII score with selected anthropometric parameters and biochemical risk factors for CVD. In addition, the relationship between inflammatory potential of diets of urban and rural residents of Lower Silesia based on DII with the incidence of MetS and its components was assessed.

Material and methods: Publications assessed the relationship between DII and current diet, nutritional value of diets and determined the correlation of DII score with selected anthropometric and biochemical parameters and with the incidence of MetS and its components of the inhabitants of the Lower Silesian Voivodship who were selected from the population of the PURE international cohort study aged 35-70. There were total of 2039 study participants. Individuals who did not meet the criterion of adequate dietary energy intake (for men < 800 kcal, >4200 kcal, for women < 600 kcal, >3500 kcal) were excluded. In addition, participants were excluded from the study due to missing data for more than one variable. Finally, a total of 1791 individuals were included in the first study and 1570 in the second study. Participants' habitual food intake was assessed with the Food Frequency Questionnaire (FFQ), which was developed and validated for the population of PURE study Lower Silesia. Thirty-seven dietary food components and products were used to calculate the DII score in both publications, additionally diets were characterized depending on their inflammatory potential.

Among 1791 participants, the relationship between DII and sex, age, place of living, marital status, education, smoking, alcohol consumption, physical activity, body mass index (BMI), waist circumference (WC), waist-hip ratio (WHR), total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), triglycerides (TG), fasting glucose (FG) and blood pressure were assessed. Based on selected parameters of the lipid profile, atherogenic indexes (Atherogenic index of plasma, AIP and Castelli's Risk Index, CRI) were calculated. In order to calculate the atherogenicity of daily food rations, the

polyunsaturated fatty acid (PUFA [g])/saturated fatty acid (SFA [g]) equation was used. Product groups and nutritional value specific to each tercile of DII were defined, excluding confounding factors. In addition the study group (n = 1570) was characterized according to sex and the relationship between DII and the occurrence of MetS was assessed. All statistical analyzes were performed using R software (statistical language and environment, version 3.5.1. R Foundation for Statistical Computing, Vienna, Austria) with the exception of the power analysis performed in the G*Power program (version 3.1.9.6).

Results: The first study: the mean DII score of study participants was -0.15 ± 2.89 , indicating slightly anti-inflammatory potential of their diets. The energy value of diets, the intake of simple sugars, the proportion of dietary energy from total fats, SFAs, PUFAs, and cholesterol level were reflected by positive DII scores. The proportion of dietary energy from protein, total carbohydrates, MUFAs, and the PUFA/SFA ratio was reflected by negative DII scores. Pro-inflammatory diet, defined as T3, was negatively associated with the intake of fruits, vegetables, legumes, beverages, low-fat poultry, soups, nuts, seeds, raisins, and tea compared to their intake in T1. Participants in T3 consumed more fish, juices, refined cereals, processed and unprocessed red meat, high-fat/processed poultry, sweets (including chocolate), sugar and honey, fats except for vegetable oils, low-fat milk and dairy, high-fat cheese and cream, potatoes, French fries, alcohol, and eggs. In the group of women, significantly higher WC and WHR were associated with more pro-inflammatory diets. TG concentrations were lower in T1 compared to T2 and T3. FG levels were significantly lower in T1 and T2 compared to T3. The mean value of AIP in all study participants indicated an increased risk of developing CVD regardless of the DII terciles. CRI was optimal in T1 group. Higher values of both indices were reported in T2 and T3 compared to T1.

The second study: Overall, no increased incidence of MetS and its components was observed for DII Tercile (T) 3 compared to T1, except for an increase in the incidence of the

TG component of T3 compared to T1 (odds ratios [OR] 1.34; 95% confidence intervals [CI] = 1.01 to 1.78) in the unadjusted model. In the adjusted model, a lower incidence of the abnormal fasting glucose component was observed at T2 compared to T1 (OR 0.71 95% CI = 0.54 to 0.94).

Conclusions: (1) Among participants with pro-inflammatory diets, higher mean values of TG, FG, API, and CRI in the group of men and women, and higher WC and WHR in the group of women were reported. (2) Anthropometric and biochemical parameters were more favorable among study participants whose diets had higher content of vegetables, fruits, nuts, seeds, raisins, pulses, low-fat poultry, and tea. The association of beverages consumption with dietary inflammatory potential requires further study. (3) Study participants, whose diets were pro-inflammatory, consumed more refined grain products, sweets, juices, red meat, high-fat cheese and cream, alcohol, fats (except for vegetable oils), potatoes, sugar and honey, French fries, fried fish, and processed/high-fat poultry. Moreover, higher consumption of milk, low-fat dairy, and eggs in study participants with pro-inflammatory diets was reported, which may be due to the fact that these food products are associated with unhealthy dietary habits. However, their consumption should not be considered as an independent CVD risk factor. (4) No association was found between the DII and MetS as calculated using the FFQ, except for TG in the crude model. The lack of association between DII and MetS in this study may be related to the fact that risk factors for the development of chronic diseases act for a long time, until the accumulation of disease development. (5) Results of this study are informative and provide an important basis for further research on the quality of diet and nutrition.

Key words: cardiovascular diseases; cardiovascular risk; dietary inflammatory index; diet; PURE study; metabolic syndrome; inflammation; nutrition